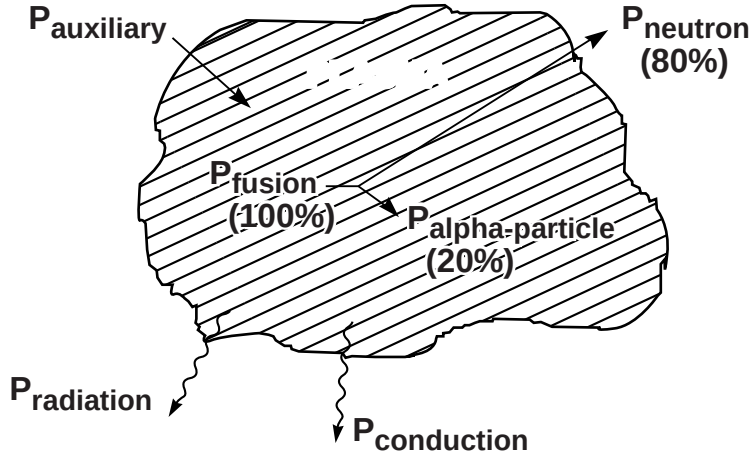
Plasma power balance

DT fusion power: P_{fusion} (17.6 MeV) = $P_{neutron}$ (14.1 MeV) + $P_{alpha\ particle}$ (3.5 MeV)



Plasma power balance: $P_{alpha\ particle} + P_{auxiliary} = P_{conduction} + P_{radiation}$

Condition	Power gain: $Q = P_{fusion}/P_{auxiliary}$
• "Plasma breakeven"	Q = 1
• Minimum useful to study bulk plasma heating by fusion alpha particles	Q = 5
• "Engineering breakeven"	Q ~ 10
• Minimum requirement for an economic electricity-producing reactor	Q > 20
• Expected range for attractive commercial reactors	Q ~ 30–50
• "Ignition"	Q = ∞